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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
ZALASKY, KATHERINE M	
ART UNIT	PAPER NUMBER
1797	

NOTIFICATION DATE	DELIVERY MODE
10/14/2009	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

striker@strikerlaw.com

Office Action Summary	Application No.	Applicant(s)	
	10/563,354	SCHANZ ET AL.	
	Examiner	Art Unit	
	KATHERINE ZALASKY	1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 June 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-19* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claims 1-19, as amended 24 June 2009, are currently pending.

Claim Objections

1. **Claim 3** is objected to because of the following informalities: in line 2 of **claim 3**, "wherein wherein" should be replaced with "wherein". Appropriate correction is required.

Claim Rejections - 35 USC § 103

2. **Claims 1-19** are rejected under 35 U.S.C. 103(a) as being unpatentable over Hemming ("10.3 Liquid-Liquid Extraction (Solvent Extraction)") in view of Ehrfeld et al. (US 2003/0039169).

Regarding **claim 1**, Hemming discloses a process for extracting a substance from one of at least two immiscible fluid phases (10.3.1 Physical Basics, ¶1-2), comprising the steps of:

- providing at least a first fluid and a second fluid that, after mixing form at least two immiscible fluid phases wherein the first fluid contains at least one substance that is extractable by the second fluid (10.3.1 Physical Basics, ¶1-2, 10.3.2 Extraction Equipment, ¶1-3)
- allowing the at least two immiscible fluid layers to separate (10.3.2 Extraction equipment, ¶1-3)

The reference does not disclose the process comprising the steps of mixing the first fluid and the second fluid by means of at least one static micromixer wherein said at least one micromixer comprises at least one component in the form of a disk:

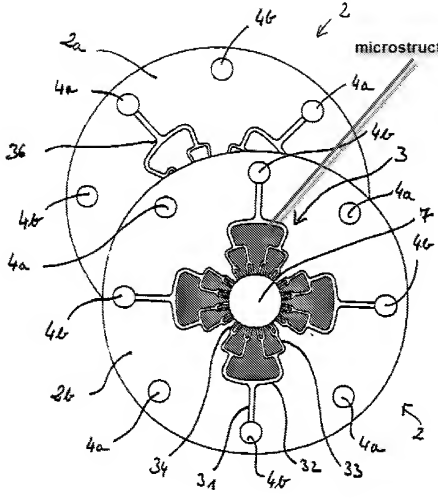
- said disk comprises a single mixing zone, at least one inlet opening disposed in a plane of said disk for introduction of at least one feed stream into a linking channel and with at least one outlet opening disposed in the plane of said disk for outflow of the stream directly into said single mixing zone, said at least one inlet opening being connected with said at least one outlet opening in a communicating manner via said linking channel which is disposed in the plane of said disk
- said linking channel is divided into two or more part channels by microstructure units immediately before opening into the mixing zone, and each of the part channels has a respective width in a millimeter to sub--millimeter range that is smaller than the width of the mixing zone

Ehrfeld et al. discloses a static micromixer with at least one component in the form of a disk (Figure 3a, supply element 2, [0051]) and whereby said disk has:

- a single mixing zone, at least one inlet opening disposed in a plane of said disk for introduction of at least one feed stream into a linking channel and with at least one outlet opening disposed in the plane of said disk for outflow of the stream directly into said single mixing zone, said at least one inlet opening being connected with said at least one outlet opening in a communicating manner via said linking channel which is disposed in the plane of said disk (Figure 3a, supply channel 4a, 4b, microchannels 31, 32, 33, 34, outlet at the end of microchannel 34 into opening 7 – becomes mixing zone when all plates are stacked together, [0051])

- said linking channel is divided into two or more part channels by microstructure units immediately before opening into the mixing zone, and each of the part channels has a respective width in a millimeter to sub--millimeter range that is smaller than the width of the mixing zone (Figure 3a, [0051], microchannel 31, 32, 33, 34, opening 7)
- said microstructure units are in contact with said mixing zone (Figure 3a, see annotation below, every shaded microstructure part is in contact with the mixing zone)

Fig. 3a)



Ehrfeld et al. discloses that the static micromixer is simple, compact, and provides identical volumetric flow from each outlet into the mixing chamber ([0010]). Further, the disks may be manufactured as two plates with grooves, which, when aligned together, form circular microchannels; this design allows for simple

manufacturing and reduces production costs ([0031]). While Ehrfeld et al. does not explicitly disclose that the micromixer is used for mixing fluids in an extraction process, static micromixers are well known in the art to have applications in extraction procedures (as evidenced by Fujii et al., JP 2001-182217 as translated by US 6,851,846, C2/L64-C3/L4 and by Löwe et al., WO 02/16017 as translated by US 6,935,768, C1/L7-8, L30-36).

It would have been obvious to one having ordinary skill in the art at the time of the invention to use a static micromixer to mix the fluid phases in the extraction process of Hemming, as taught by Ehrfeld et al., since static micromixers are known to be used in extraction processes in the art and the micromixer of Ehrfeld et al. provides identical volumetric flow through all microchannels and is simple and economical to produce.

While Ehrfeld et al. does disclose that the channels are *microchannels*, modified Hemming does not explicitly disclose that the widths of the part channels being in the millimeter to sub-millimeter range; however, since the instant specification is silent to unexpected results, it would have been obvious to one of ordinary skill in the art to change the width of the part channels, since such a modification would have involved a mere change in the size (or dimension) of a component. A change in size (dimension) is generally recognized as being within the level of ordinary skill in the art. *In re Rose*, 220 F.2d 459, 105 USPQ 237 (CCPA 1955). Where the only difference between the prior art and the claims is a recitation of relative dimensions of the claimed device, and the device having the claimed dimensions would not perform differently than the prior art device, the claimed device is not patentably distinct from the prior art device,

Gardner v. TEC Systems, Inc., 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984).

Regarding **claims 2 and 3**, modified Hemming discloses all of the claim limitations as set forth above. Additionally, Ehrfeld et al. discloses the process wherein:

- the micromixer comprises a housing, at least 2 fluid inlets and at least one fluid outlet, and the housing contains two or more of said at least one components in the form of a disk ([0051], Figure 3a, supply channels 4a, 4b, outlets at the end of microchannel 34 into opening 7)
- wherein a plurality of disks are superposed on one another so that the inlet openings form subsidiary channels for introducing the liquid phase that is to be mixed, the mixing zones together form a main channel for removing the mixed phase and the main channel and subsidiary channels extend through the stack ([0051], Figure 3a)

Regarding **claim 4**, modified Hemming discloses all of the claim limitations as set forth above, but does not explicitly disclose that an extraction agent is conveyed through the main channel and the first fluid containing the substance to be extracted is conveyed through at least one subsidiary channel of the micromixer. However, the substance to be extracted and the extraction agent would inherently flow from the subsidiary channels into the main channel during the mixing operation.

Regarding **claims 5-8**, modified Hemming discloses all of the claim limitations as set forth above, but does not explicitly disclose the process wherein:

- at the outlet into the mixing zone the widths of the part channels of the disks are from 1 µm to 2 mm
- the ratio of the greatest width of the linking channel and/or the width of the inlet opening to the width of the part channels of the at least one disks is greater than 2
- the ratio of the length to the width of the part channels of the at least one disks is from 1:1 to 20:1
- that the ratio of the width of the mixing zone to the width of the part channels of the at least one disks is greater than 2

However, since the instant specification is silent to unexpected results, it would have been obvious to one of ordinary skill in the art to change lengths/widths of the part channel outlets, the widths of the linking channels and the width of the mixing channel, since such a modification would have involved a mere change in the size (or dimension) of a component. A change in size (dimension) is generally recognized as being within the level of ordinary skill in the art. *In re Rose*, 220 F.2d 459, 105 USPQ 237 (CCPA 1955). Where the only difference between the prior art and the claims is a recitation of relative dimensions of the claimed device, and the device having the claimed dimensions would not perform differently than the prior art device, the claimed device is not patentably distinct from the prior art device, *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984).

Regarding **claims 9 and 10**, modified Hemming discloses all of the claim limitations as set forth above. Additionally, Ehrfeld et al. discloses the process wherein:

- the at least one disk is additionally provided with at least one flow-through opening (Figure 3a, opening 4a on supply element 2b)
- at least one of the inlet openings or flow-through openings or the mixing zone of the disk is enclosed by the plane of the at least one disk and the linking channel is formed by an indentation (Figure 3a, opening 4a on supply element 2b, opening 7)

Regarding **claim 11**, modified Hemming discloses all of the claim limitations as set forth above. Additionally, while Ehrfeld et al. does not explicitly disclose the process wherein at least one of the inlet openings or flow-through openings or the mixing zone of the at least one disk is disposed at the edge of the disk or as a recess at the edge of the disk in the currently cited embodiment, the reference does show inlet opening disposed at the edge of disks in separate embodiments (Figure 1a, supply channel 4). Therefore, it would be obvious to one having ordinary skill in the art to change the configuration of the inlet opening in the process of modified Hemming since the change in the configuration of a device is obvious absent persuasive evidence that the particular configuration is significant. *In re Dailey*, 357 F.2d 669, 149 USPQ 47 (CCPA 1966).

Regarding **claims 12-14**, modified Hemming discloses all of the claim limitations as set forth above. Additionally, Ehrfeld et al. discloses the process wherein:

- the at least one disk is provided with at least two inlet openings for at least two different fluid streams and each inlet opening is connected with the

mixing zone through a linking channel (Figure 3a, [0051], supply channels 4a, 4b)

- the at least one disk is provided with two inlet openings for two different fluid streams, each inlet opening being connected with the mixing zone through a linking channel, and the outlet openings of the two linking channels are disposed opposite one another (Figure 3a, supply channels 4a, 4b, [0051])
- the outlet openings of the at least one disk are arranged on a circular line (Figure 3a, openings at the end of microchannels 34)

Regarding **claim 15**, modified Hemming discloses all of the claim limitations as set forth above. Additionally, Ehrfeld et al. discloses the process wherein the at least one disk is provided with additional through-holes and additional part channels that are integrated into the microstructure units and are separated from the part channels (Figure 3a, supply element 2b has through holes 4a and multiple part channels 31-34 associated with supply channels 4b). Further, it is noted that the addition of more through holes and part channels would have been obvious to one having ordinary skill in the art at the time the invention was made. Mere duplication of parts has no patentable significance unless a new and unexpected result is produced. *In re Harza*, 124 USPQ 378, 380 (CCPA 1960). Further, it has been held that mere duplication of the essential working parts of a device involves only routine skill in the art. *St. Regis Paper Co. v. Bemis Co.*, 193 USPQ 8.

Regarding **claims 16-17**, modified Hemming discloses all of the claim limitations as set forth above. Additionally, Ehrfeld et al. discloses the process wherein:

- the linking channels of the disks are formed by indentations, and the linking channels before opening into the mixing zone are divided into part channels by the microstructure units disposed on the disks (Figures 3b-d, [0051]-[0055])
- the linking channels of the disks are formed by recesses in the disks, the disks being disposed as intermediate disks between a cover disk and a bottom disk, and the linking channels before opening into the mixing zone are divided into part channels by microstructure units disposed on the cover disks and/or bottom disks (Figures 3a-d, [0051]-[0055])

Regarding **claims 18-19**, modified Hemming discloses all of the claim limitations as set forth above, but does not explicitly disclose that the flow rate of the fluid stream into the mixing zone is greater than the flow rate of the fluid mixture within the mixing zone or that the mixing in the mixing zone occurs at least in part by turbulence. However, as a fluid stream exits from a narrow channel into a large chamber, the flow rate of the stream will inherently decrease. Further, as fluid streams will be exiting into the mixing zone from multiple angles in modified Hemming, there will inherently be turbulent mixing.

Response to Arguments

3. Applicant's arguments filed 24 June 2009, with respect to the rejection based on Hemming in view of Ehrfeld, have been fully considered but they are not persuasive.

The Applicant argued that there is no structure in Ehrfeld which may be confused with the microstructure units recited in the instant claims, citing that the part channel is formed is formed by division of a feed stream by the microstructure part in the present invention and that the microstructure units are in contact with the mixing zone. This argument is not persuasive because every one of the microstructure parts of Ehrfeld are in contact with the mixing zone and perform the function of dividing the feed stream into a plurality of part streams (see above rejection). Therefore, as there are no additional structural limitations in the claims, the microstructures of Ehrfeld meet the claim limitations.

The Applicant also argued that the sequential bifurcation of a channel into a plurality of distinct microchannels before outflow into a mixing zone cannot reasonably be equated with a single channel that is divided into a plurality of part channels by microstructures just before outflow into a mixing zone. This is not persuasive because the claim limitations state:

"said linking channel is divided into two or more part channels by microstructure units immediately before opening into the mixing zone"

In Ehrfeld, the linking channel (microchannel 31) is divided into two or more part channels (microchannels 32, 33, 34) by microstructure units (as labeled above on annotated figure 3a) immediately before opening into the mixing zone (mixing zone formed by opening 7, microchannels 34 empty directly into this mixing zone).

Further, an alternative interpretation of Ehrfeld could also be made:

Alternatively, in Ehrfeld the linking channels (microchannels 33) are divided into two or more part channels (microchannels 34) by microstructure units (as labeled above on annotated figure 3a) immediately before opening into the mixing zone (mixing zone formed by opening 7, microchannels 34 empty directly into this mixing zone).

Either interpretation reads on the claim limitations.

4. Applicant's arguments, see pg 11-13, filed 24 June 2009, with respect to the rejection based on Hemming in view of Vanden Bussche, have been fully considered and are persuasive. The rejection of **claims 1-19** over Hemming in view of Vanden Bussche has been withdrawn. The microstructure units of Vanden Bussche are not in contact with the mixing zone and the flow from the part channels does not directly enter the mixing zone, it first empties into a larger chamber before being forced through an additional channel. Therefore, the amendments to the claims have overcome this rejection.

Conclusion

5. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the

shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to KATHERINE ZALASKY whose telephone number is (571) 270-7064. The examiner can normally be reached on Monday-Thursday, 7:30am - 6:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vickie Kim can be reached on (571)272-0579. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Krishnan S Menon/
Primary Examiner, Art Unit 1797

/KZ/
7 October 2009